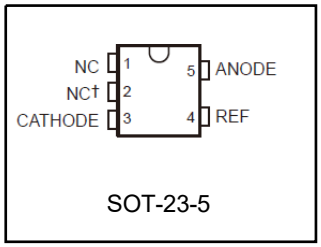
Programmable Precision Reference

LR431XMT1G

DESCRIPTION

The LR431 is a three-terminal adjustable regulator with a guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between Vref(approximately 2.5V) and 36V with two external resistors. It provides very wide applications, including shunt regulator, series regulator, switching regulator, voltage reference and others.

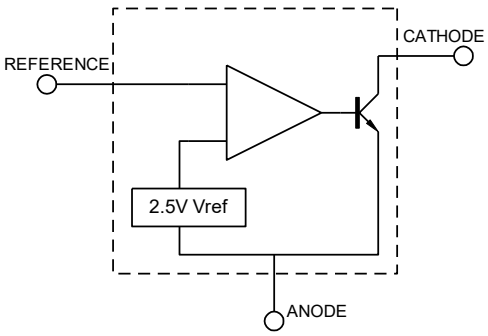


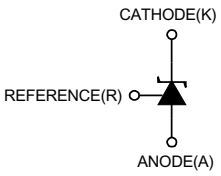
Pin 2 is connected internally to ANODE (die substrate) and should be floating or connected to ANODE.

FEATURES

- Low Dynamic output impe dance 0.1Ω (Typ)
- Adjustable output voltage
- Fast turn-on response
- Sink current capability of 0.1mA to 100mA
- Low output noise
- Industrial temperature range
- Electrostatic discharge voltage 2.5kV

BLOCK DIAGRAM





ABSOLUTE MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified))

PARAMETER	SYMBOL	VALUE	UNIT
Cathode Voltage	V_{KA}	36	V
Cathode Current Range(Continuous)	I_{KA}	-100 ~ +150	mA
Reference Input Current Range	Iref	-0.05 ~ +10	mA
Operating Junction Temperature	Tj	150	°C
Thermal Resistance	θ_{JA}	206	°C/W
Operating Ambient Temperature	Topr	-40 ~ +125	°C
Storage Temperature Temperature	Tstg	-65 ~ +150	°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Cathode Voltage	V_{KA}	V_{REF}		36	V
Cathode Current	I_{KA}	0.3		100	mA

ELECTRICAL CHARACTERISTICS(Ta=25°C,unless otherwise specified)

Characteristic		Symbol	Test Conditions		Min	Typ	Max	Unit
Reference Input Voltage 1	0.5%	Vref	$V_{KA}=V_{REF}, I_{KA}=10mA$		2.488	2.50	2.512	V
	1%				2.475	2.50	2.525	
Deviation of reference Input Voltage Over temperature		ΔVref	$V_{KA}=V_{REF}, I_{KA}=10mA$ $T_{MIN}\leq T_A\leq T_{MAX}$			15	35	mV
			$V_{KA}=V_{REF}, I_{KA}=10mA$ T_A=0 to 125°C			8	17	mV
Ratio of Change in Reference Input Voltage to the Change in Cathode Voltage		$\Delta V_{ref}/\Delta V_{KA}$	I_{KA}=10mA	ΔV_{KA}=10V~V_{REF}	-2.7	-1.0		mV/V
				ΔV_{KA}=36V~10V	-2	-0.4		
Reference Input Current		Iref	I_{KA}=10mA,R1=10kΩ ,R2=∞			0.5	1.2	μA
Deviation of Reference Input Current Over Ful l Temperature Range		ΔIref/ΔT	I_{KA}=10mA,R1=10kΩ,R2=∞ T_A= full Temperature			0.4	1 2	μA
Minimum cathode current for regulation		I_{KA}(min)	$V_{KA}=V_{REF}$			0.08	0.3	mA
Off-state cathode Current		I_{KA}(OFF)	V_{KA}=36V,V_{REF}=0			0.01	0.8	μA
Dynamic Impedance		Z_{KA}	$V_{KA}=V_{REF}, I_{KA}$=0.2 to 100mA f≤ 1.0kHz			0.1	0.37	Ω

CLASSIFICATION OF V_{ref} AND PACKAGE

Type	RanK	Range(V)	Marking
LR431AMT1G	0.5%	2.488~2.512	RAM
LR431BMT1G	1%	2.475~2.525	RM

Packgage: SOT23-5

TYPICAL PERFORMANCE CHARACTERISTICS

Fig 1 Cathode Current Vs Cathode Voltage

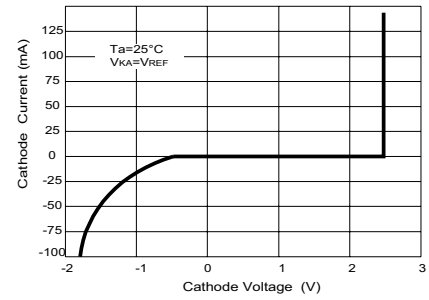


Fig 2 Cathode Current Vs Cathode Voltage

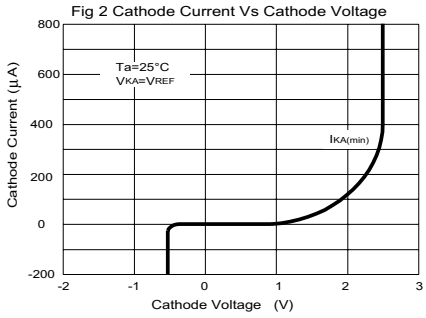


Fig 3 Change in Reference Input Voltage Vs Cathode voltage

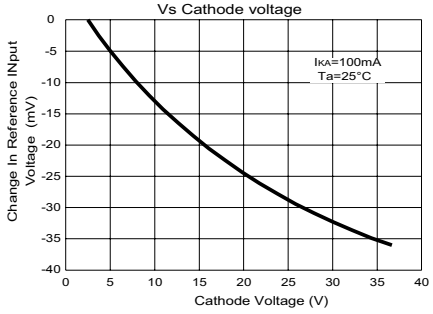


Fig 4 Pulse Response

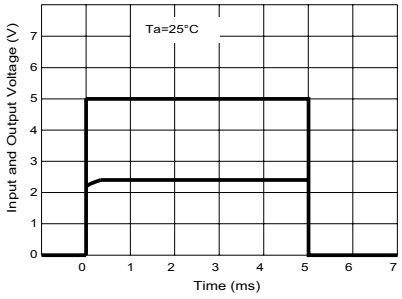
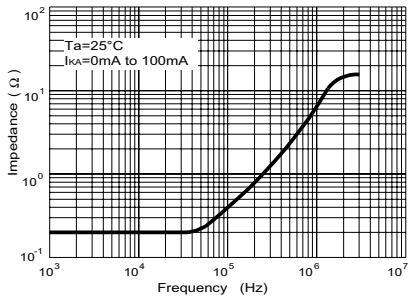


Fig 5 Dynamic Impedance Vs Frequency



TEST CIRCUIT

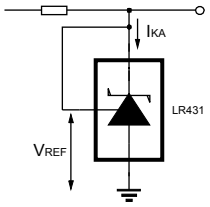
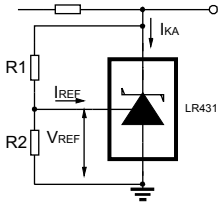


Fig6 Test Circuit For VKA=VREF



VKA=VREF (1+R1/R2)+IREF R1

Fig 7 Test Circuit for VKA >= VREF

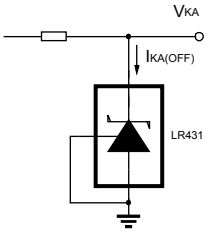


Fig 8 Test Circuit For IKA(OFF)

APPLICATION CIRCUIT

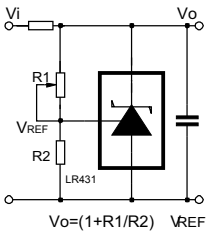


Fig 9 Shutdown Regulator

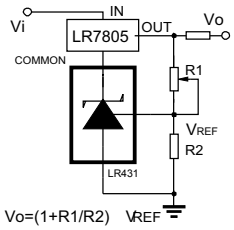


Fig 10 Output Control of a Three -Terminal Fixed Regulator

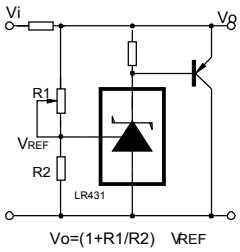


Fig 11 Higher-current Shunt Regulator

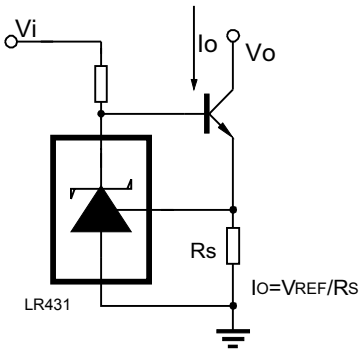


Fig 12 Constant-current Sink

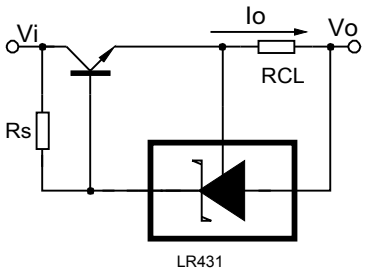
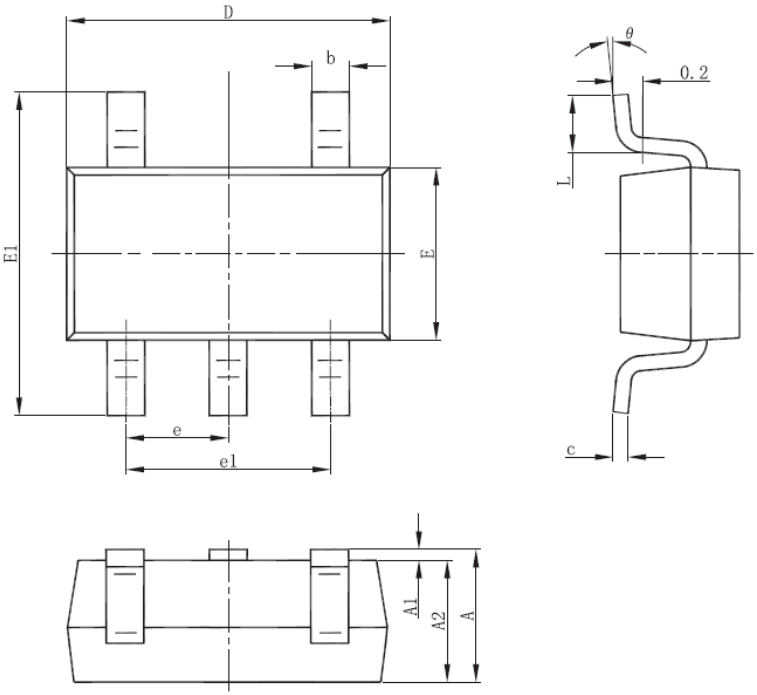


Fig 13 Current Limiting or Current Source

- **SOT-23-5 PACKAGE OUTLINE DIMENSIONS**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°